CHAPTER 2

DESCRIPTION OF THE EMORY RIVER WATERSHED

2.1 BACKGROUND.

The Emory River Watershed includes cool, clear streams with high gradients. Parts of Clear Creek, Daddy's Creek, the Emory River, and the Obed River are part of the National Wild and Scenic River System.

This Chapter describes the location and characteristics of the Emory River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Emory River Watershed is located in East Tennessee and includes parts of Bledsoe, Cumberland, Fentress, Morgan, and Roane counties.

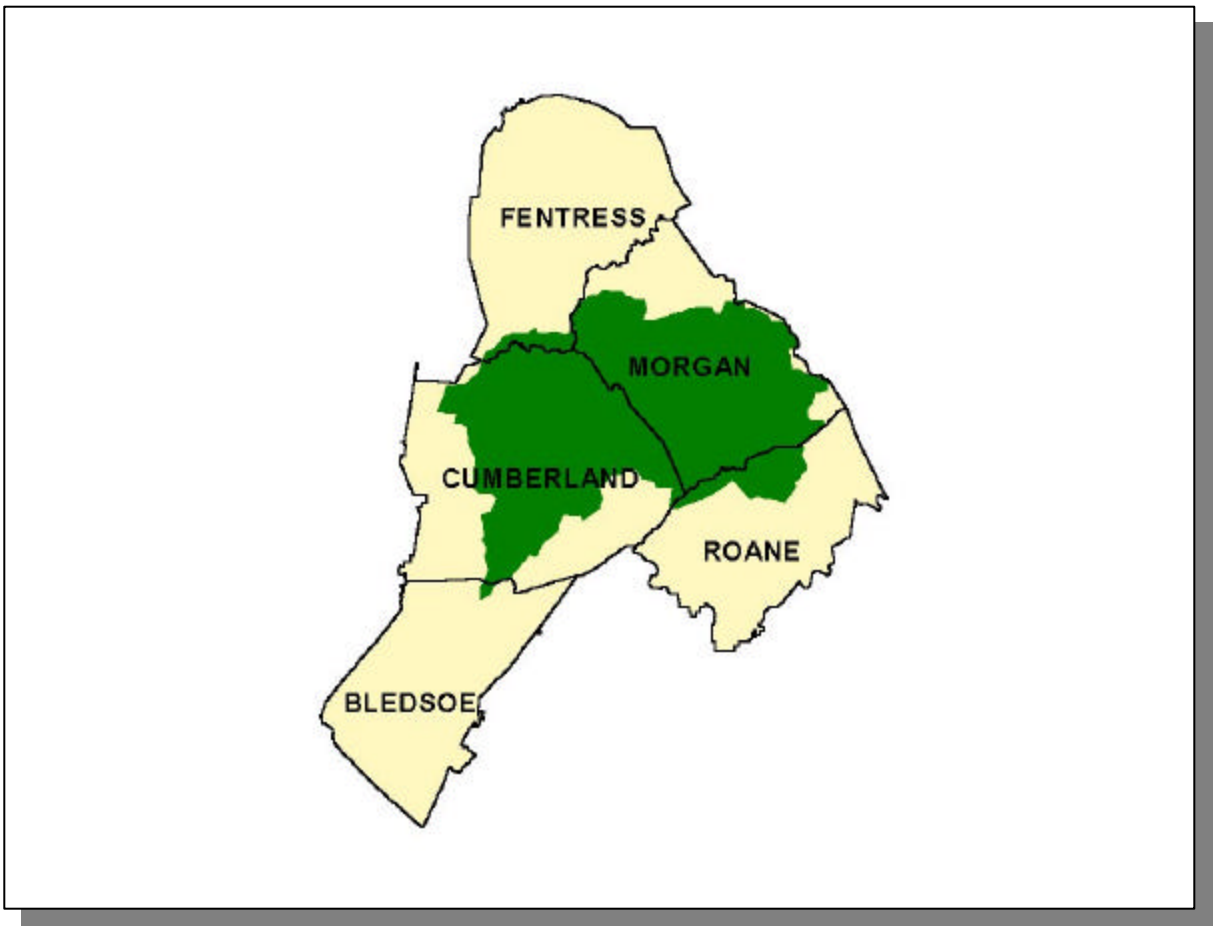

Figure 2-1. General Location of the Emory River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Cumberland	46.3
Morgan	45.9
Roane	5.3
Fentress	2.2
Bledsoe	0.3

Table 2-1. The Emory River Watershed Includes Parts of Five East Tennessee Counties.

2.2.B. Population Density Centers. Sixteen state highways serve the major communities in the Emory River Watershed.

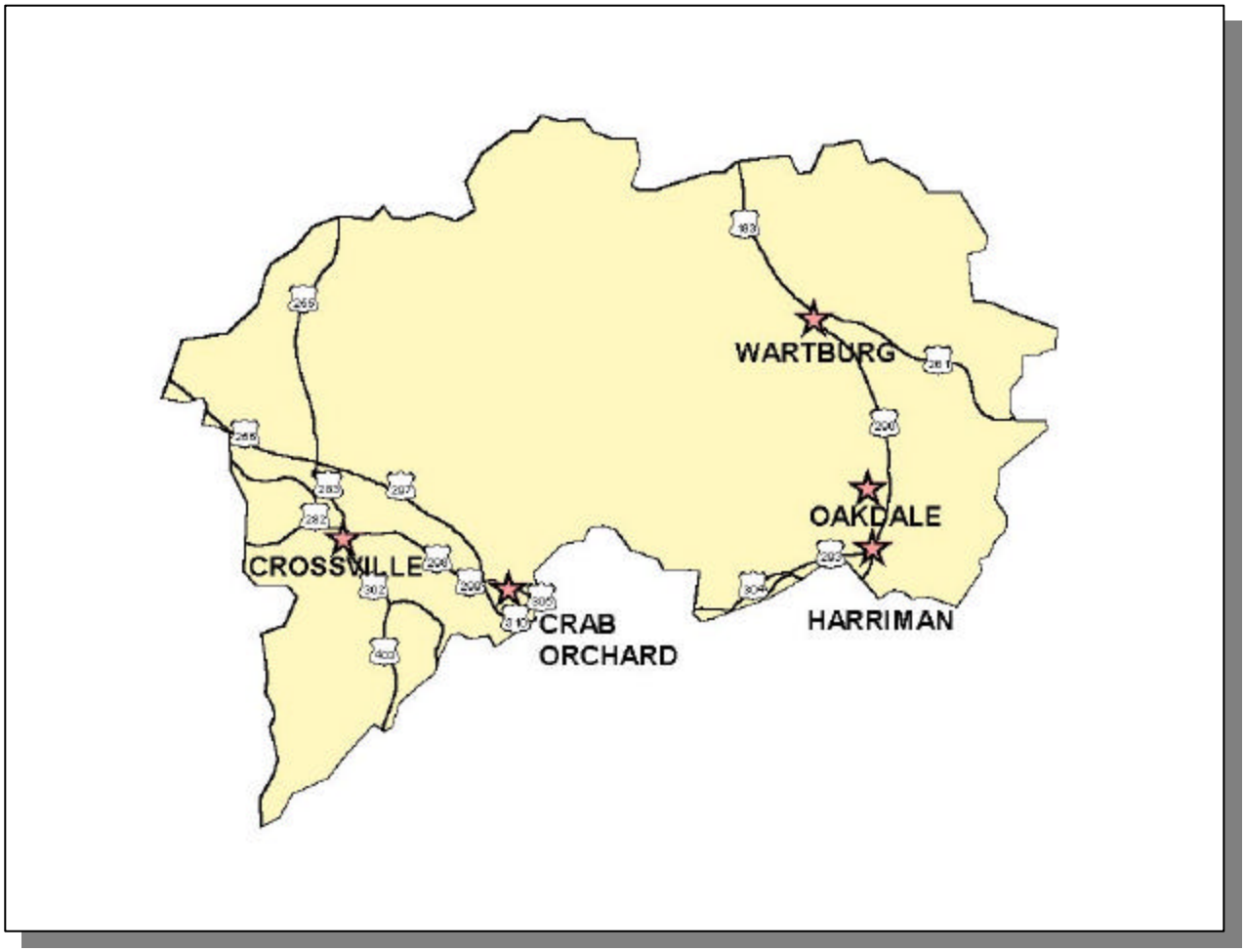

Figure 2-2. Municipalities and Roads in the Emory River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Harriman	7,119	Roane
Crossville*	6,930	Cumberland
Wartburg*	932	Morgan
Crab Orchard	876	Cumberland
Oakdale	268	Morgan

Table 2-2. Municipalities in the Emory River Watershed. *Population based on 1990 census (Tennessee Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Emory River Watershed, designated the Hydrologic Unit Code 06010208 by the USGS, is approximately 872 square miles and drains to the Clinch River embayment of Watts bar Reservoir.

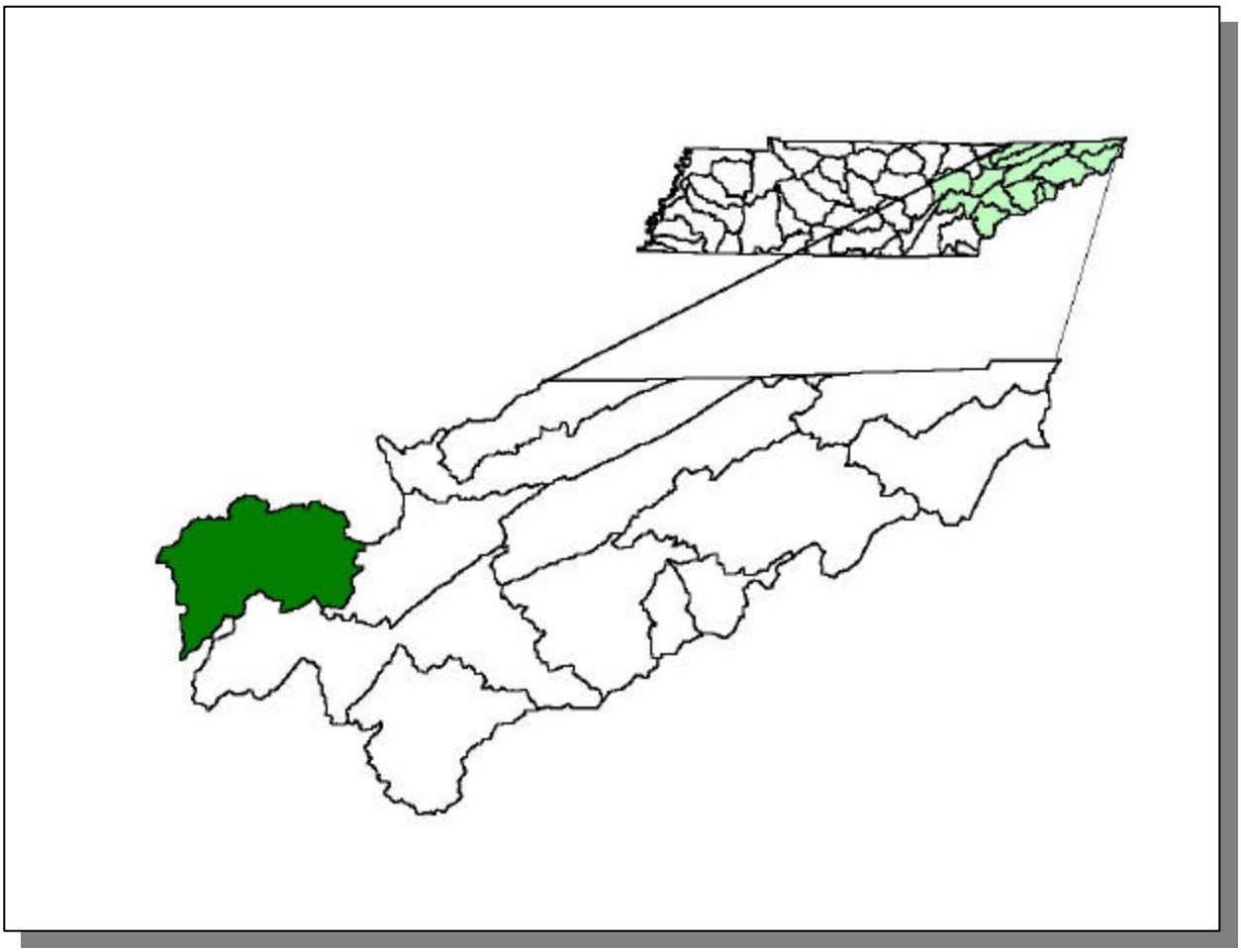

Figure 2-3. The Emory River Watershed is Part of the Upper Tennessee River Basin.

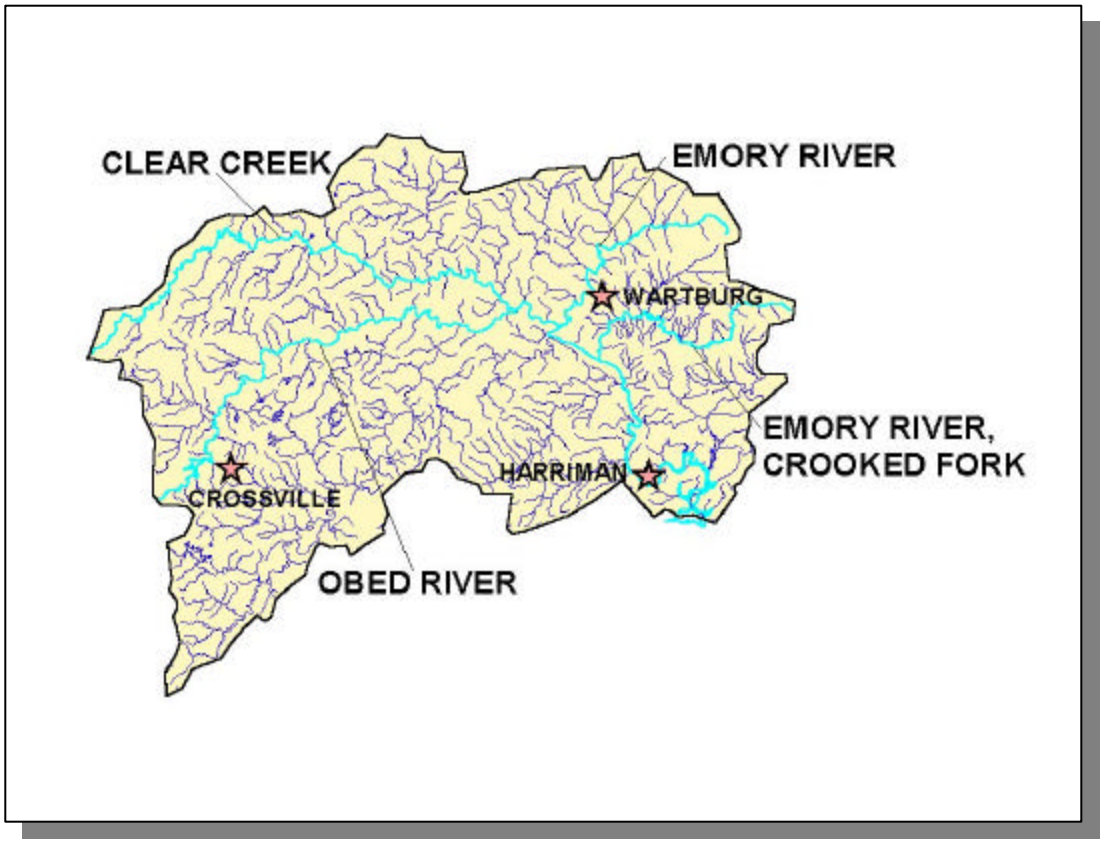

Figure 2-4. Hydrology in the Emory River Watershed. *There are 1,283 stream miles and 47 lake acres recorded in River Reach File 3 in the Emory River Watershed. Locations of Emory River, Crooked Fork, Obed River, Crossville, Harriman, and Wartburg are shown for reference.*

2.3.B. Dams. There are 47 dams inventoried by TDEC Division of Water Supply in the Emory River Watershed. These dams either retain at least 30 acre-feet of water or have structures at least 20 feet high. Additional dams may be found in the watershed.

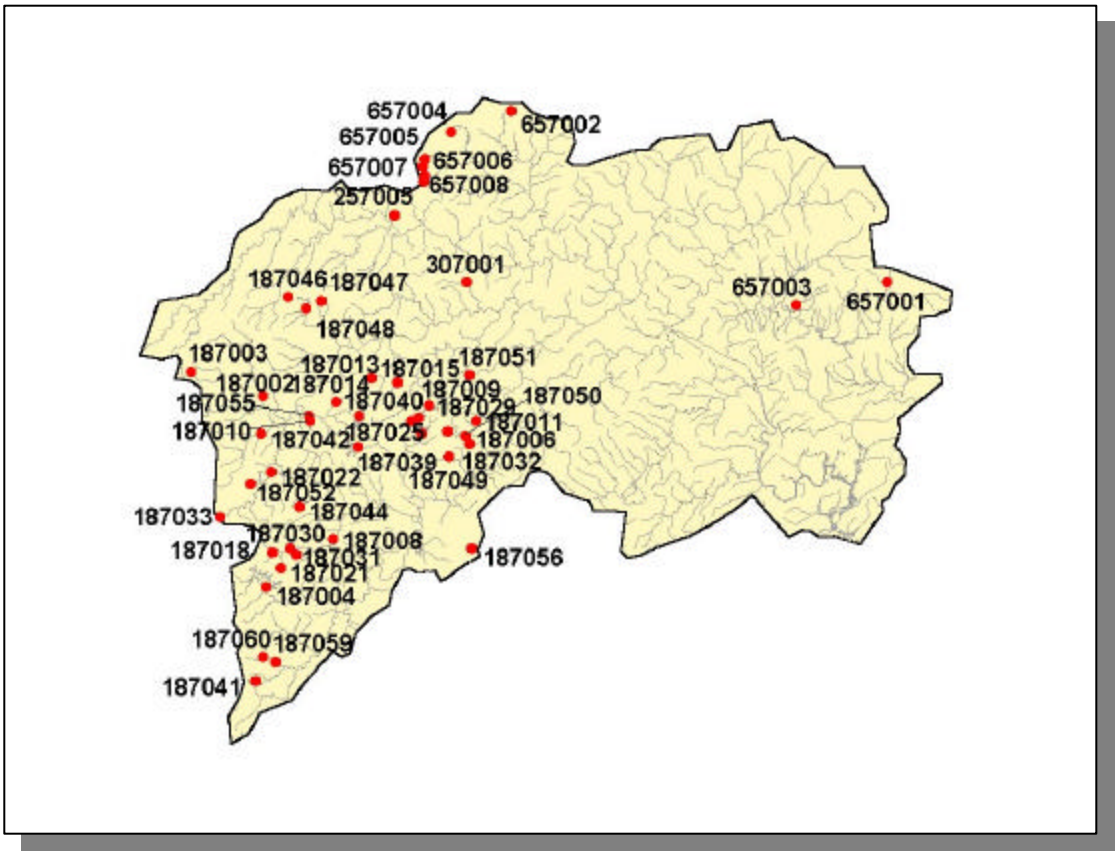

Figure 2-5. Location of Inventoried Dams in the Emory River Watershed. *Additional information is provided in Emory-Appendix II.*

2.4 LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 1992 Multi-Resolution Land Cover (MRLC) satellite imagery.

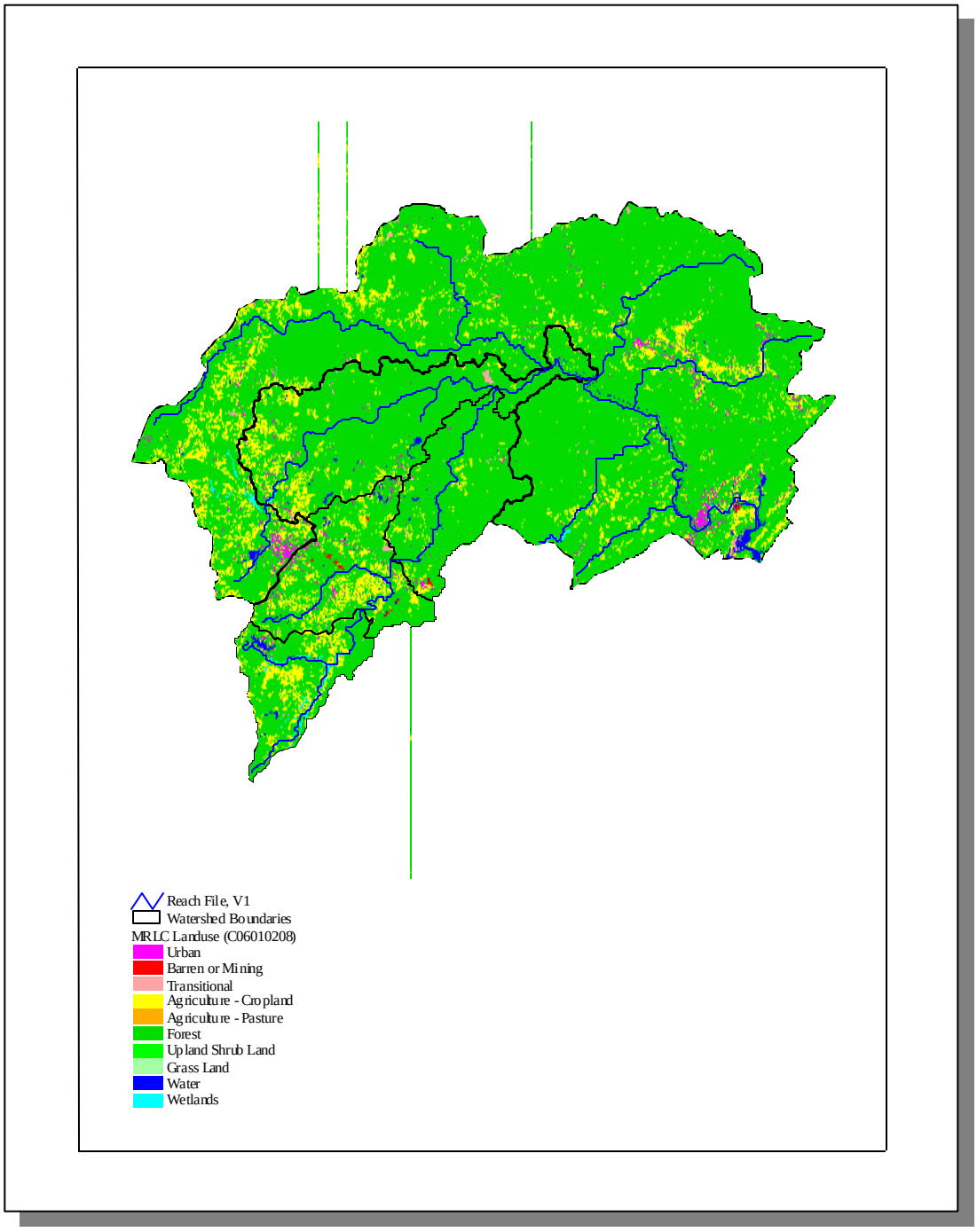

Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

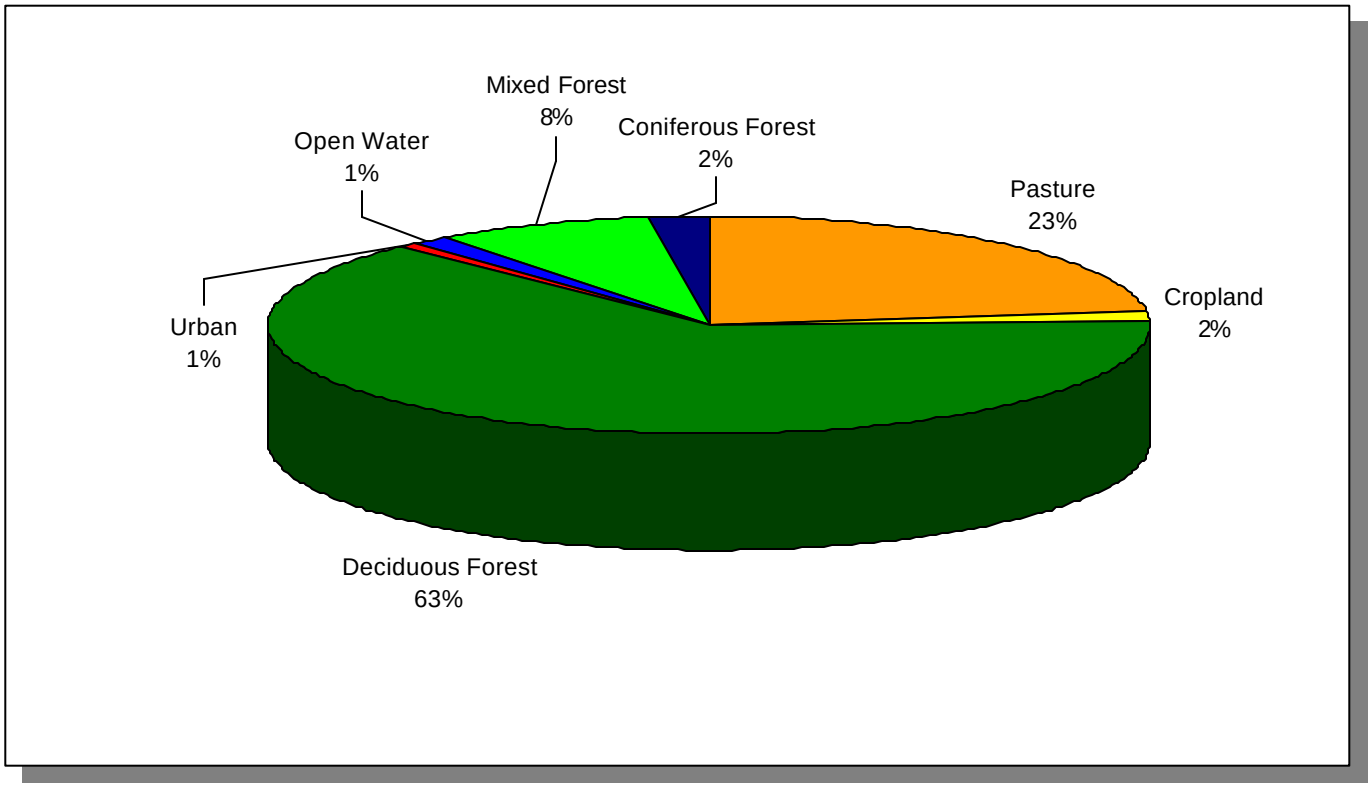

Figure 2-7. Land Use Distribution in the Emory River Watershed. *More information is provided in Emory-Appendix II.*

2.5. ECOREGIONS AND REFERENCE STREAMS. Ecoregions are defined as relatively homogeneous areas of similar geography, topography, climate and soils that support similar plant and animal life. Ecoregions serve as a spatial framework for the assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregion studies include the selection of regional stream reference sites, identifying high quality waters, and developing ecoregion-specific chemical and biological water quality criteria.

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Emory River Watershed lies within 3 Level III ecoregions (Ridge and Valley, Southwestern Appalachians, and Central Appalachians) and contains 5 Level IV subecoregions (Griffen, Omernik, Azavedo, 1997):

- Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f) form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forest, and sycamore-ash-elm riparian forest are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

- The Southern Dissected Ridges and Knobs (67i) contain more crenulated, broken, or hummocky ridges, compared to the smoother, more sharply pointed sandstone ridges of Ecoregion 67h. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of Ecoregion 67, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forest and pine forests are typical for the higher elevations of the ridges, with areas of white oaks, mixed mesophytic forest, and tulip poplar on the lower slopes, knobs, and draws.

- The Cumberland Plateau's (68a) tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim (71g) to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains (69d) or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian-age conglomerate, sandstone, siltstone, and shale is covered by mostly well drained, acidic soils of low fertility. The region is forested, with some agriculture and coal mining activities.

- The Plateau Escarpment (68c) is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus

slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

- The Cumberland Mountains (69d), in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

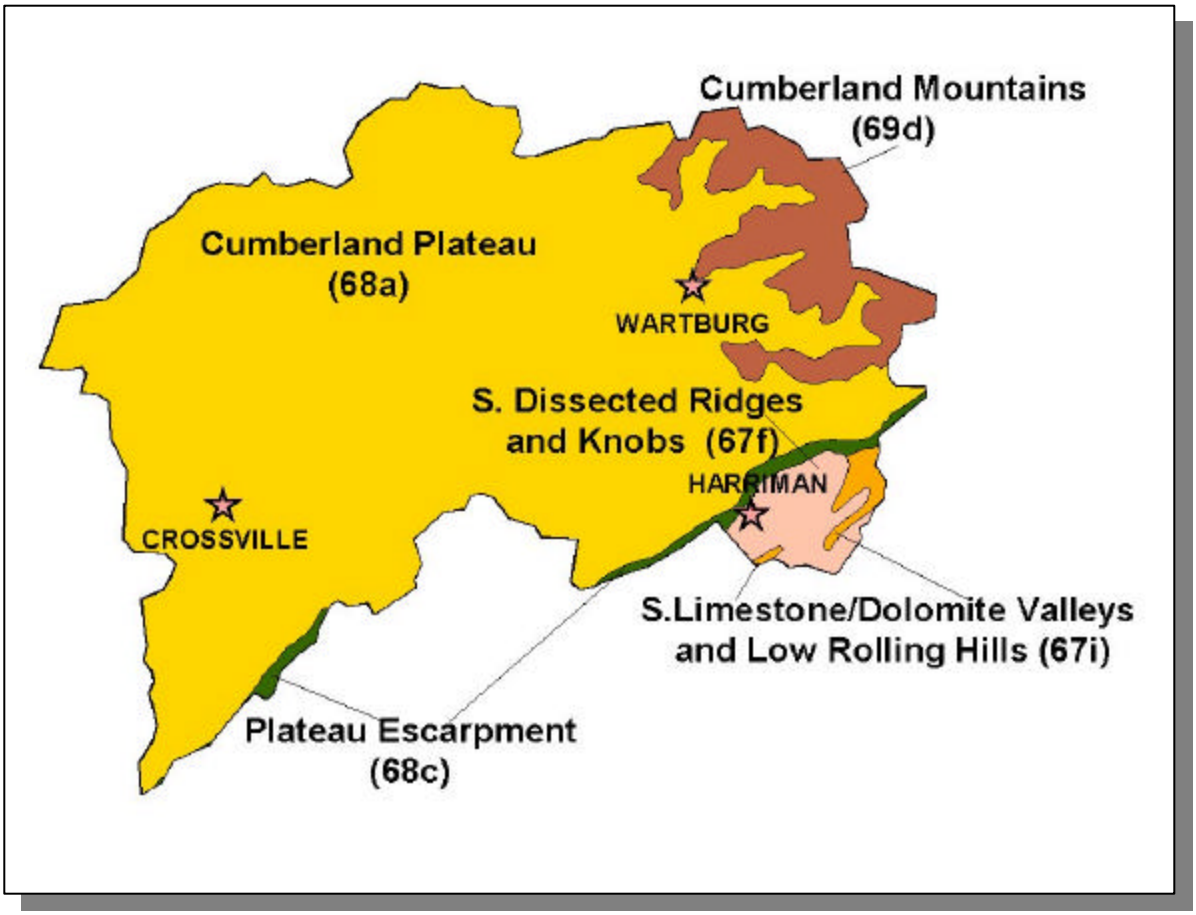

Figure 28. Level IV Ecoregions in the Emory River Watershed. *Locations of Crossville, Harriman, and Wartburg are shown for reference.*

Each Level IV Ecoregion has at least one reference stream associated with it. A reference stream represents a least impacted condition and may not be representative of a pristine condition.

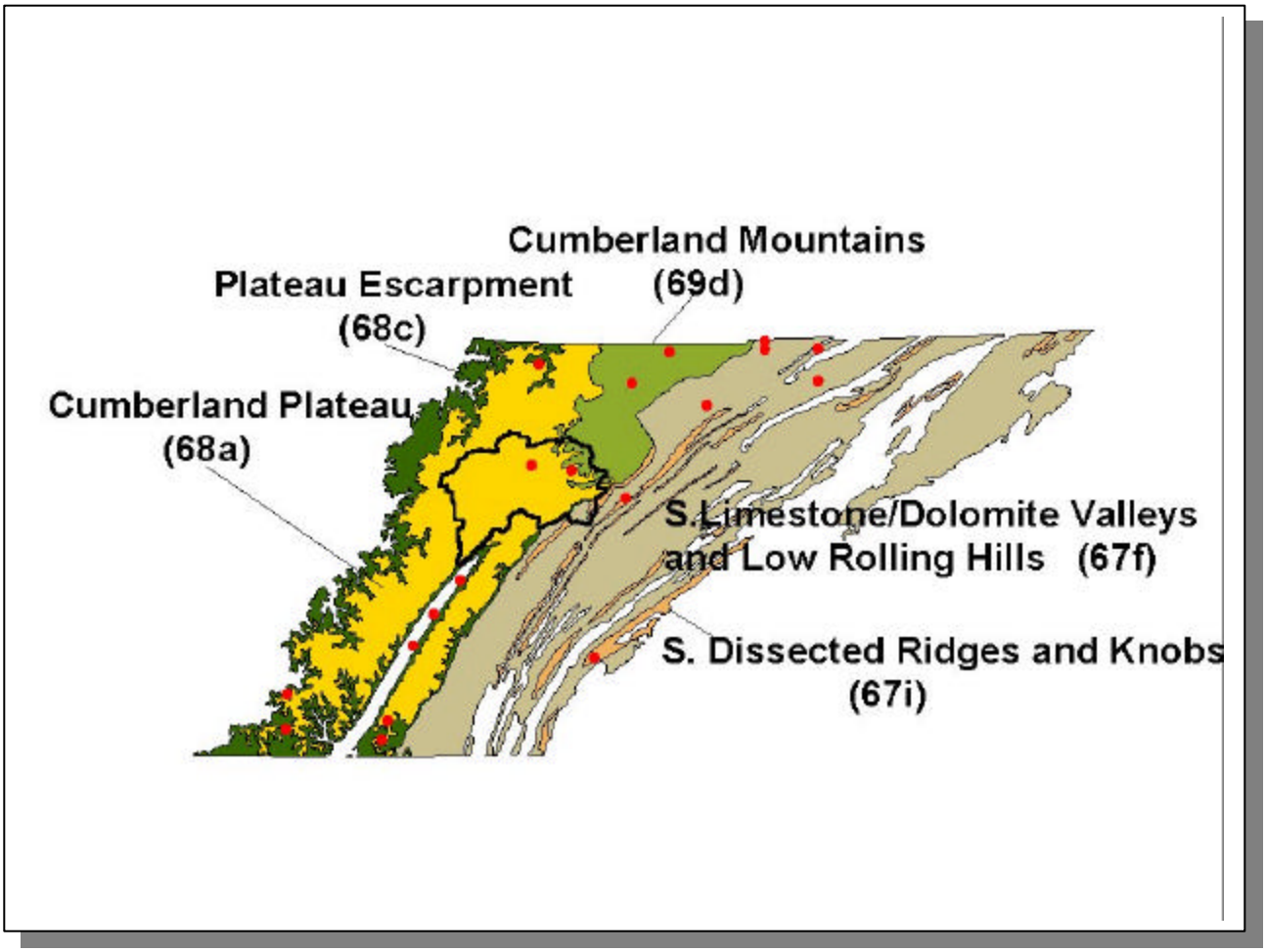

Figure 2-9. Ecoregion Monitoring Sites in Level IV Ecoregions 67f, 67i, 68a, 68c, and 69d. The Emory River Watershed is shown for reference. Additional information is provided *Emory-Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Designated State Natural Areas. The Natural Areas Program was established in 1971 with the passage of the Natural Areas Preservation Act. The Emory River Watershed has one Designated Natural Area:

> Frozen Head Designated State Natural Area, 11,876 acres of relatively undisturbed forest containing some of the richest wildflower areas in Tennessee.

Figure 2-10. There is One Designated State Natural Area in the Emory River Watershed.

2.6.B. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service, and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the Federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Crustaceans	1
Insects	0
Mussels	4
Snails	2
Amphibians	4
Birds	4
Fish	5
Mammals	4
Reptiles	2
Plants	42
Total	**68**

Table 2-3. There are 68 Documented Rare Plant and Animal Species in the Emory River Watershed. Additional rare plant and animal species may be present.

Additionally, in the Emory River Watershed, there are five rare fish species, two rare snail species, four rare mussel species, and one rare crustacean species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Crypinella monacha	Spotfin chub	T	E
Etheostoma cinereum	Ashy darter		D
Percina aurantiaca	Tangerine darter		D
Percina macrocephala	Longhead darter		T
Phoxinus tennesseensis	Tennessee dace		D
Cambarus sp.	Emory River crayfish		
Lithasia geniculata	Ornate rocksnail		
Stenotrema edgarianum	Sequatchie slitmouth		
Epioblasma turgidula	Turgid-blossom	E	E
Fusconaia cuneolus	Fine-rayed pigtoe	E	E
Lampsilis virescens	Alabama lamp mussel	E	E
Villosa perpurpurea	Purple bean	E	E

***Table 2-4. Rare Aquatic Species in the Emory River Watershed**. Federal Status: E, Listed Endangered by the U.S. Fish and Wildlife Service, T, Listed Threatened by the U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; T, Listed Threatened by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency.*

2.6.C. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of Tennessee's Wetland Strategy, which is described at http://www.state.tn.us/environment/epo/wetlands/strategy.zip.

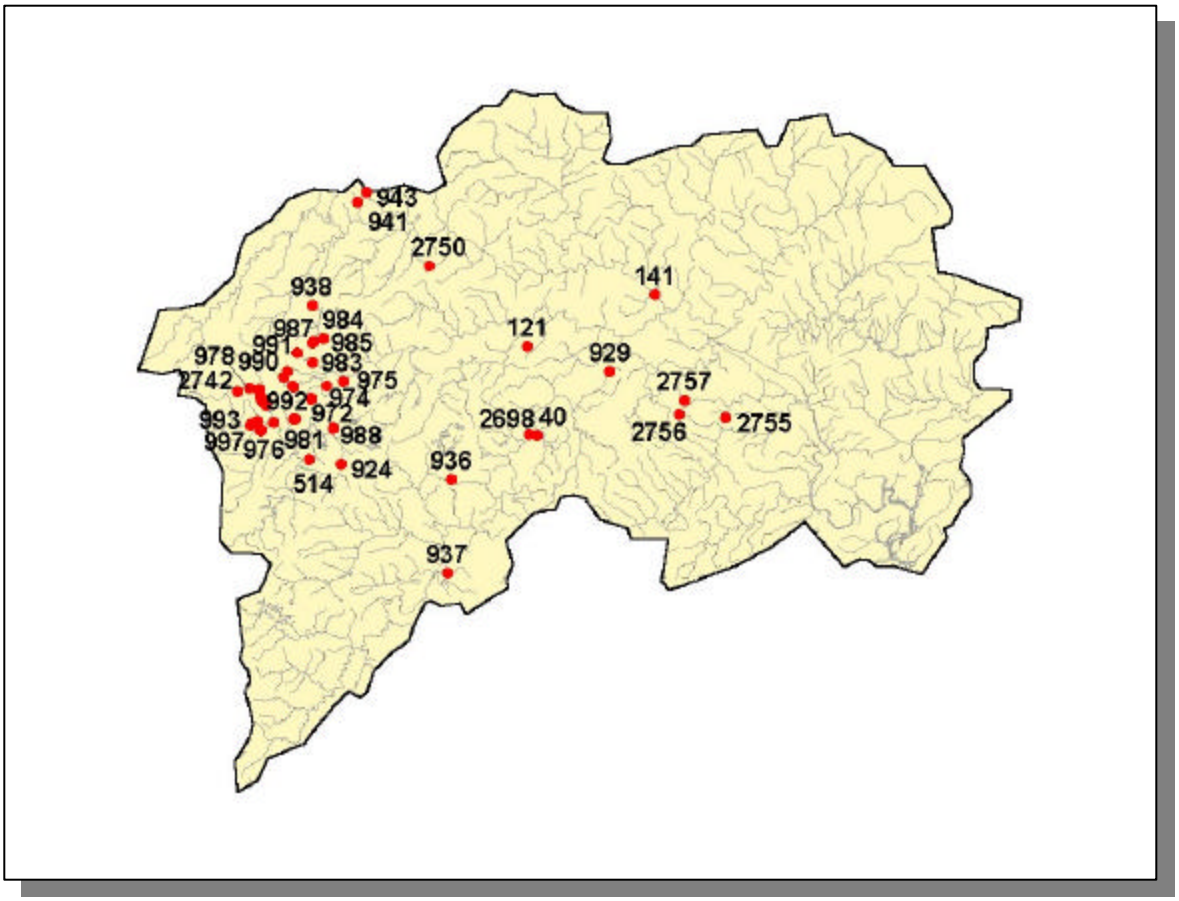

Figure 2-11. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Emory River Watershed. There may be additional wetland sites in the watershed. *Additional information is provided in Emory-Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. National Wild and Scenic River. Parts of Clear Creek, Daddy's Creek, the Emory River, and the Obed River have been designated as part of the National Wild and Scenic River System. The portions designated are: The segment of the Obed from the western edge of the Catoosa WMA to the confluence with the Emory River, the segment of Clear Creek from the Morgan county line to the confluence with the Obed, Daddy's Creek segment from the Morgan county line to the Obed River, and Emory River from the confluence with the Obed River to the Nemo Bridge. The National Wild and Scenic Rivers System was created by Congress in 1968 in an effort to preserve streams in their free-flowing condition.

Figure 2-12. Portions of Clear Creek, Daddy's Creek, the Emory River and the Obed River are Designated as Part of the National Wild and Scenic River System. *Locations of Crossville and Wartburg are shown for reference.*

2.7.B. Outstanding National Resource Waters. A portion of the Obed River, Daddy's Creek, and Clear Creek have been designated Outstanding National Resource Waters (ONRW) by the Tennessee Water Quality Control Board.

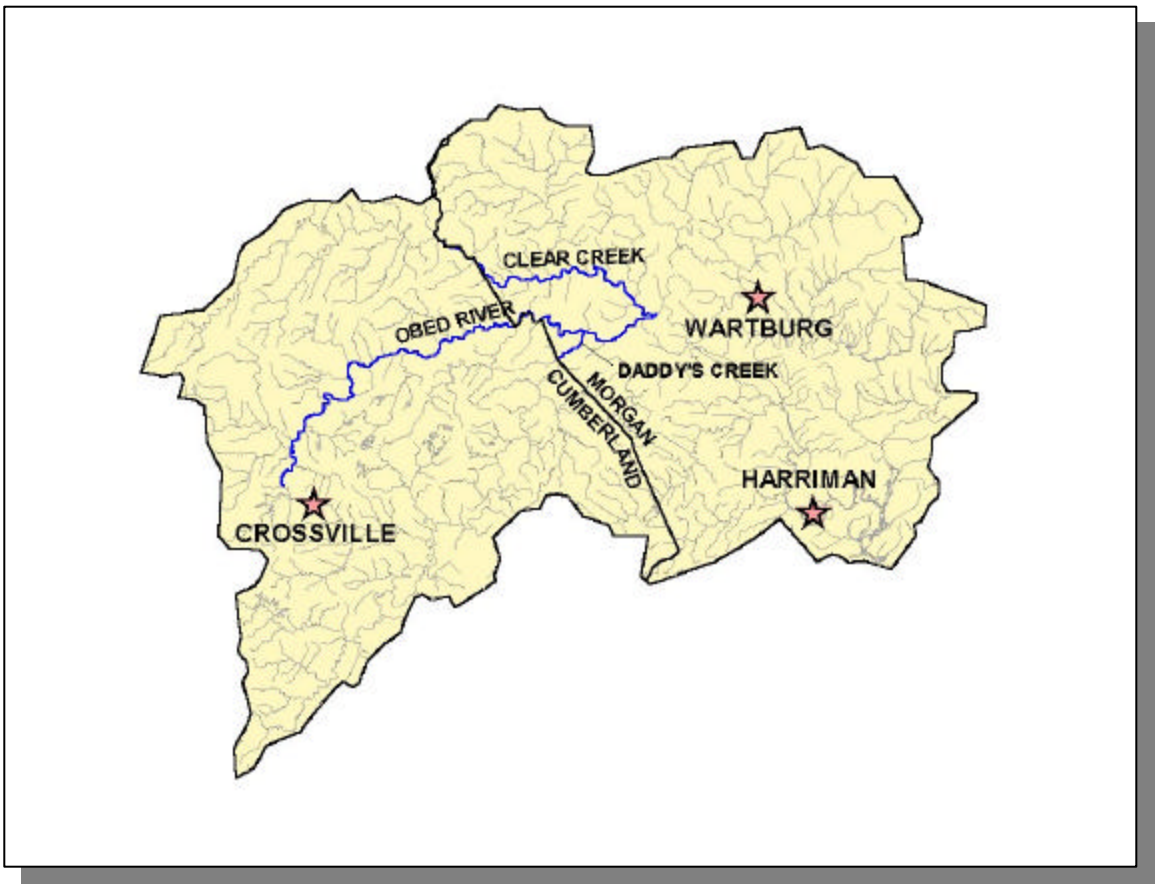

Figure 2-13. Location of ONRW Designated Waters in Emory River Watershed. *The Morgan/Cumberland County boundary and locations of Crossville, Harriman, and Wartburg are shown for reference.*

2.7.C. Nationwide Rivers Inventory. The Nationwide Rivers Inventory, required under the Federal Wild and Scenic Rivers Act of 1968, is a listing of free-flowing rivers that are believed to possess one or more outstanding natural or cultural values. Exceptional scenery, fishing or boating, unusual geologic formations, rare plant and animal life, cultural or historic artifacts that are judged to be of more than local or regional significance are the values that qualify a river segment for listing. The Tennessee Department of Environment and Conservation and the Rivers and Trails Conservation Assistance branch of the National Park Service jointly compile the Nationwide Rivers Inventory from time to time (most recently in 1997). Under a 1980 directive from the President's Council on Environmental Quality, all Federal agencies must seek to avoid or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory segments.

The most recent version of the Nationwide Rivers Inventory lists portions of four streams in the Emory River Watershed:

> Crab Orchard Creek. Remote, scenic stream that flows through Catoosa Wildlife Management Area.
>
> Clear Creek. Designated component of the National Wild and Scenic River System; remote, rugged stream partially within the Catoosa Wildlife Management Area. Mild whitewater, abundance and variety of flora and fauna.
>
> Emory River. (River mile 27, confluence with Obed River, to river mile 47, headwaters in Frozen Head State Park near Anderson county line). Scenic pastoral stream that flows through impressive gorge area, supports game fishery, designated component of National Wildlife and Scenic River System.
>
> Emory River. (River mile 14, Roane county line, to river mile 25, one mile below Nemo bridge). Scenic pastoral stream.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE
Crab Orchard Creek	X	X	X	X	X
Clear Creek	X	X	X	X	X
Emory River	X	X	X	X	X
Emory River	X	X	X	X	X

Table 2-5. Attributes of Streams Listed in the Nationwide Rivers Inventory.

Additional information may be found online at http://www.ncrc.nps.gov/rtca/nri/tn.htm

2.7.D. Interpretive Areas. Some sites representative of the cultural heritage are under state or federal protection:

- Cumberland Mountain State Park, a 1720 acre park located in Crossville
- Obed Wild and Scenic River National Recreational Area, which has 45 miles of streams available for swimming, fishing, whitewater rafting, and kayaking
- Cumberland Trail State Park, established in 1998 as a linear park with trails to extend 17 miles through the Obed Wild and Scenic River National Recreation area
- Mount Roosevelt State Forest offers hiking and backpacking trails through breathtaking scenery.

In addition, many local interpretive areas are common, most notably, Lake Tansi, a village-style resort and golf course; Crossville Recreation Park, a 40-acre outdoor park with walking trails; and Cumberland Homestead Project, the location of a historic subsistence project community, predominant building material of locally mined Crab Orchard Stone.

2.7.E. Wildlife Management Area. The Tennessee Wildlife Resources Agency manages the Catoosa, Luper Mountain, and Mount Roosevelt Wildlife Management Areas.

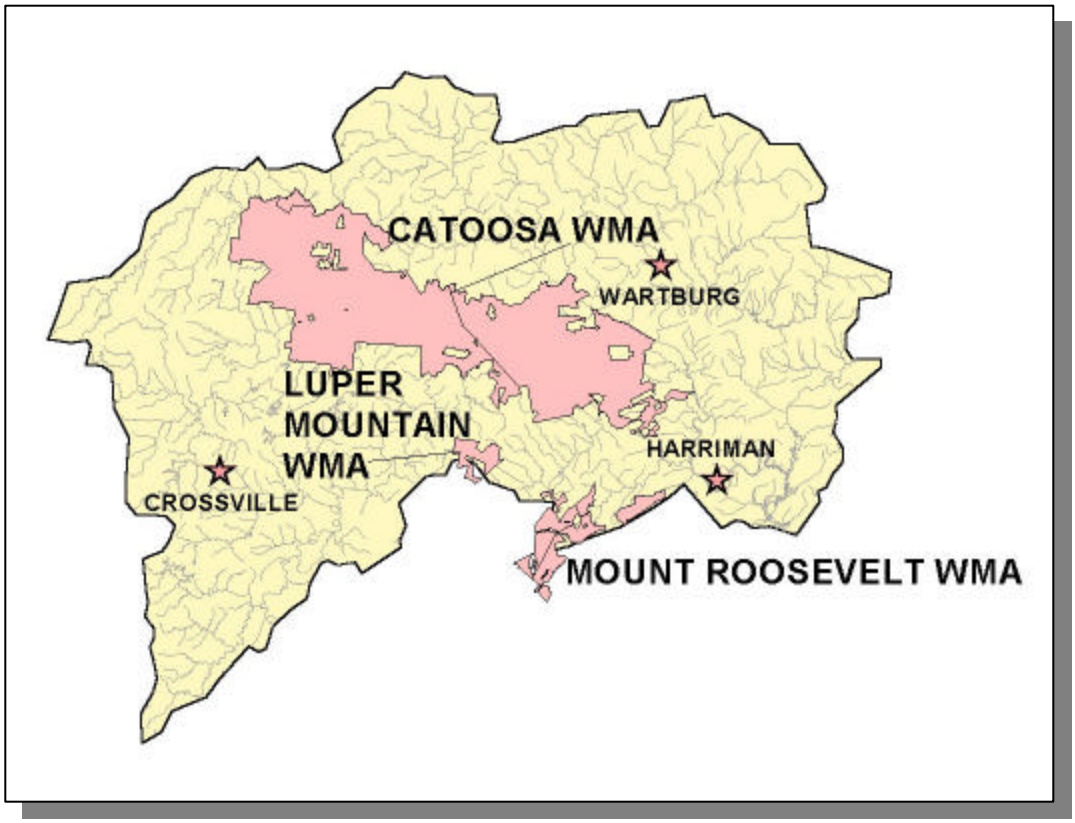

Figure 2-14. TWRA Manages Catoosa, Luper Mountain, and Mt. Roosevelt Wildlife Management Areas in the Emory River Watershed. *Locations of Crossville, Harriman, and Wartburg are shown for reference.*

2.8. TENNESSEE RIVERS ASSESSMENT PROJECT. The Tennessee Rivers Assessment is part of a national program operating under the guidance of the National Park Service's Rivers and Trails Conservation Assistance Program. The Assessment is a resource inventory of river resources, and should not be confused with "Assessment" as defined by the Environmental Protection Agency. A more complete description can be found in the Tennessee Rivers Assessment Summary Report, which is available from the Department of Environment and Conservation and on the web at:

http://www.state.tn.us/environment/riv

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Adams Creek	1			Lick Creek	3		
Basses Creek	3			Little Clear Creek	2		
Bitter Creek	3			Little Emory River	3		
Bobs Creek	2			Little Obed River	3		
Byrd Creek	3			Little Rock Creek	2		2
Caney Fork Creek	2			Meadow Creek	2		
Clear Creek	1	2		Milender Creek	2		
Cook Creek	2			Myatt Creek	1		
Crab Orchard Creek	1	2		North Creek	3		
Crooked Fork Creek	1	3		North Fork Elmore Creek	1		
Daddys Creek	1,2,3	2		Obed River	1	2	
Drowning Creek	1,3			Otter Creek	2		3
Elmore Creek	1			Rock Creek	3		2
Emory River	2,3	2		Shell Creek	2		
Flat Fork Creek	3		1	South Fork Elmore Creek	1		
Fox Creek	1		4	White Creek	2	2	
Greasy Creek	2			Witt Creek	2		
Island Creek	1			Yellow Creek	1		
Kings Creek	2						

Table 2-6. Stream Scoring from the Tennessee Rivers Assessment Project.

Categories: NSQ, Natural and Scenic Qualities
RB, Recreational Boating
RF, Recreational Fishing

Scores: 1. Statewide or greater Significance; Excellent Fishery
2. Regional Significance; Good Fishery
3. Local Significance; Fair Fishery
4. Not a significant Resource; Not Assessed as a fishery